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Title

FINAL CLOSEOUT REPORT FOR
117-F FILTER BUILDING

Author

R. B. Loveland

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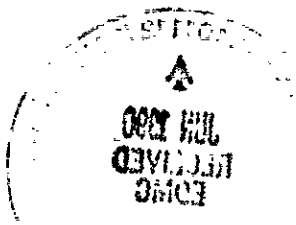

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NOTICE

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FINAL CLOSEOUT REPORT FOR 117-F FILTER BUILDING

ABSTRACT

The 117-F exhaust air filter building and associated air inlet and outlet ducts were decommissioned by UNC Nuclear Industries, under contract to DOE-RL. Decommissioning included a complete and detailed radiation survey of the building and ducts, decontamination of the facility, removal of equipment, demolition of the remaining structure and ducts, and grading of the site to blend with surrounding terrain. The site was decommissioned to meet the unconditional radiological release criteria of Radiation Control Manual UNI-M-30, REV1. The work was completed on schedule and within budget, and no further remedial action will be required for this site.

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ILLUSTRATIONS

1.0 INTRODUCTION

1.1 Project Summary

This final report documents the decontamination and decommissioning of the 117-F Exhaust Filter Building and associated inlet and outlet ducts. In November 1983, the building site was returned to the natural grade of the surrounding terrain by means of conventional backfilling and grading of the site.

1.2 References

The following documents were used in the planning and conduct of the 117-F Building decommissioning work, and are cited in this report.

1. UNI-M-30 REV1, Radiation Control Manual, UNC Nuclear Industries, March 1982.

2. J. F. Beckstrom, UNI-2674, Radiological Characterization Activities Resulting in the Unrestricted Release of the 117-F Filter Building, UNC Nuclear Industries, October 31, 1983 draft.

3. E. W. Powers, Detailed Work Procedure DW-117-1, 117-F Filter Building Decommissioning, UNC Nuclear Industries, April 11, 1983.

4. UNI-1001, 100-F Site and Facilities Description, UNC Nuclear Industries, March 13, 1978.

5. E. W. Powers and E. A. Wegener, UNI-1002, 100-F Disposition Plan and Activities Definition, UNC Nuclear Industries, April 23, 1978.

6. UNI-1003, 100-F Area Activities Description, UNC Nuclear Industries, September 15, 1978.

7. UNI-1006 REV2, 100-Areas Decommissioning Quality Assurance Implementation Plan, UNC Nuclear Industries, March 17, 1983.

8. R. A. Paasch and E. W. Powers, UNI-1007, 108-F Project Decommissioning Plan, UNC Nuclear Industries, March 15, 1983.

9. UNI-M-73, Quality Assurance Manual, United Nuclear Industries, Inc., Nuclear Operations Division, February 26, 1979.

10. L. L. Crass, UNI-M-29, Shipment of Radioactive and other Hazardous Materials, UNC Nuclear Industries, July 31, 1981.

11. UNI-946, Radiological Characterization of the Retired 100 Areas, UNC Nuclear Industries, May 26, 1978.

2.0 DESCRIPTION OF FACILITY

2.1 History

The original ventilation system installed in the 105-F Reactor Building provided prefiltered atmospheric air to noncontaminated portions of the 105-F Building. The fresh air moved through confinement zones of increasing levels of contamination and was exhausted from the 105-F Building directly to the 116-F Ventilation Exhaust Stack.

In 1960, approximately 15 years after start up of the 100-F Reactor, a final ventilation filtering system known as the 117-F Filter Building was added. The 117-F Building received exhausted air from the 105-F Building through an underground concrete inlet duct. The 117-F Building contained particulate and "halogen" (activated charcoal) filters, which trapped airborne contamination in the 105-F ventilation exhaust, before the air was discharged to the atmosphere via an underground concrete exhaust duct and the 116-F Ventilation Exhaust Stack.

2.2 Location

The 100-F Area is located within the Hanford Site on the south bank of the Columbia River approximately 30 river miles upstream and approximately 20 road miles from the City of Richland in south-eastern Washington. The site boundaries for the 100-F Area along with the location of the 117-F Filter Building, are shown in Figure 2.1. The 117-F Filter Building site (Figure 2.2) is approximately 120 feet west of the northwest corner of the 105-F Reactor Building, and 60 feet north of the north wall of the 115-F Gas Recirculation Building, all of which are located within the 100-F Area.

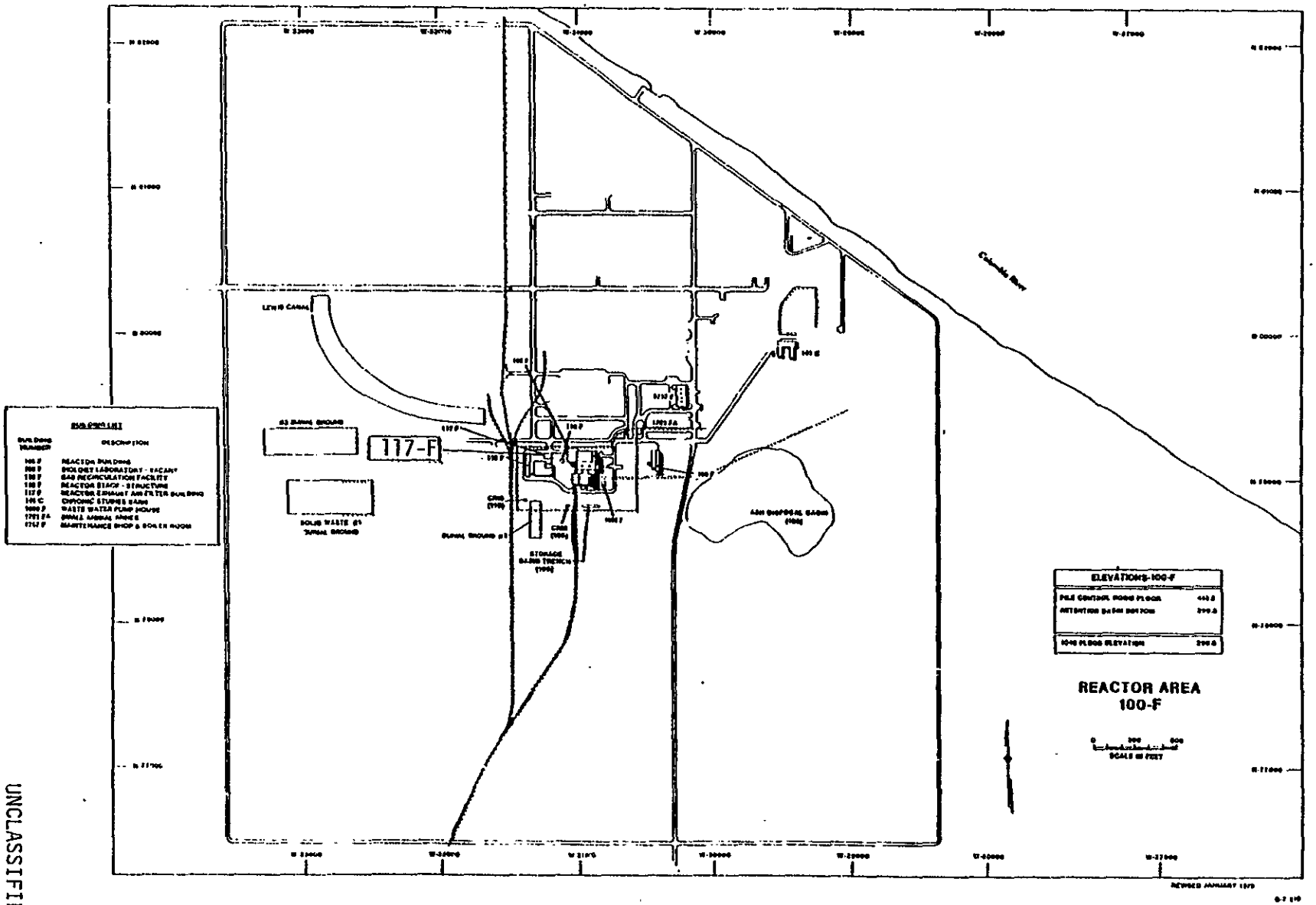


FIGURE 2.1

100-F REACTOR AREA

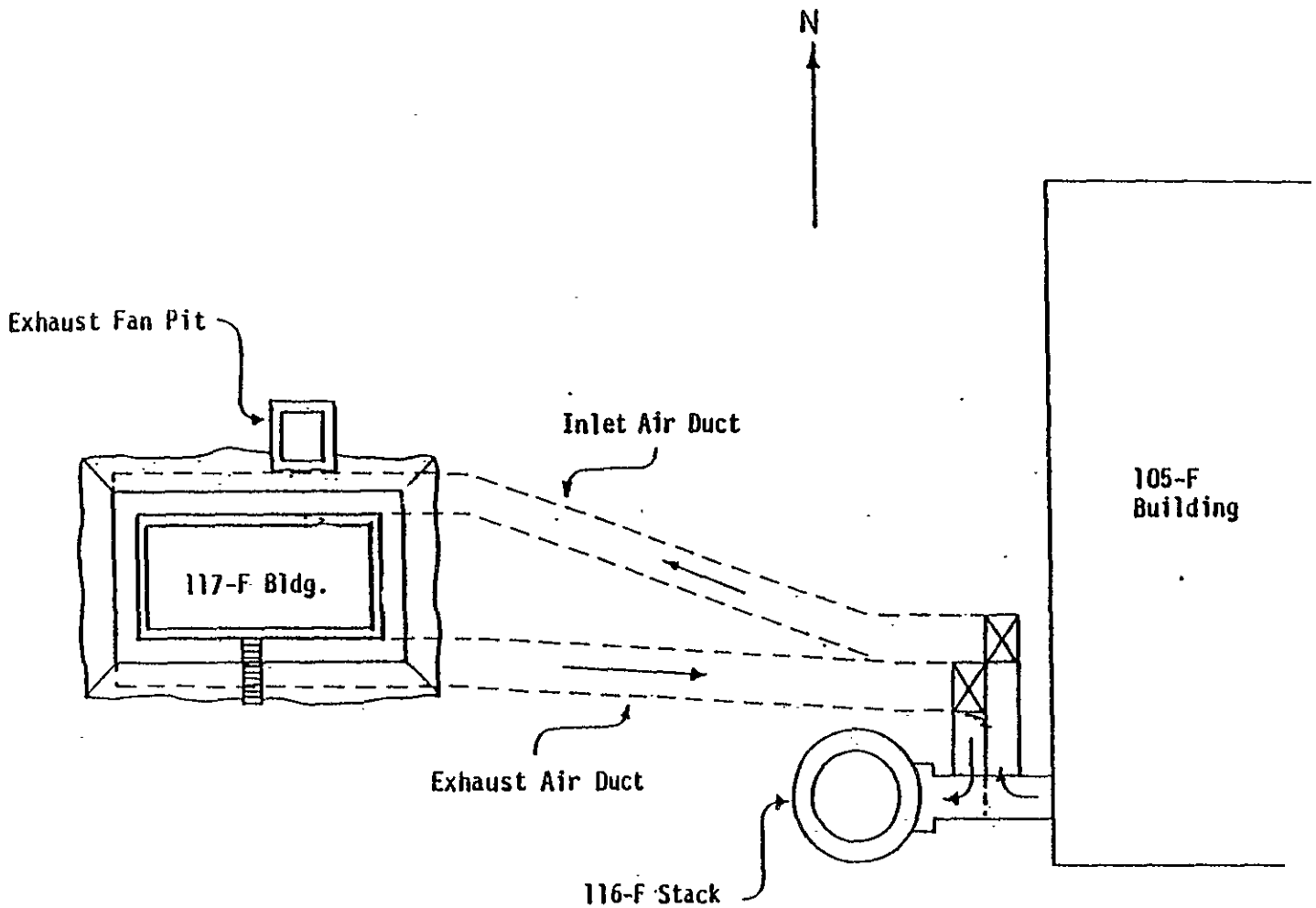


FIGURE 2.2
117-F FILTER BUILDING

2.3 Physical Description

The 117-F building was a reinforced concrete structure, 59 feet long, 39 feet wide and 35 feet high, of which 90% was below grade. The maximum thickness of the concrete walls and floors of the structure was 2 feet, with the majority of the structure's walls and floors having a thickness of 15 inches. The filter building was connected to the 105-F Building exhaust air system by an underground duct which ran from the 105-F Building exhaust fan discharge to the 117-F Building filter inlet plenum. A discharge duct conveyed the filtered air from the 117-F exhaust plenum to the 116-F Ventilation Exhaust Stack. The inlet and discharge ducts were made of reinforced concrete with a maximum thickness of 18 inches. Both ducts had inside dimensions of 5 feet wide by 11 feet 7 inches high. The inlet duct was 114 feet long and the exhaust duct was 91 feet long. The average depth of the duct roofs below grade was 8 feet. Turning vanes were installed at proper locations in the inlet and exhaust ducts to reduce flow turbulence in deflecting the air in and out of the filter cells. (See Figures 2.3.1, 2.3.2, and 2.3.3.)

The 117-F Exhaust Filter Building contained two identical filter cells separated by a two-story gallery area. The upper-story Access Gallery contained a small amount of piping and electrical gear. The flooring was metal grating. From this level, access to "A" or "B" cells could be accomplished via any of eight doors. Access to the inlet or the outlet ducts could also be obtained from the upper gallery by means of two doors, one at each end of the gallery. Fresh air supply manifolds, and in-line instrumentation lines to monitor air flow and radiation levels within the filter cells were also located on this level. (See Figures 2.3.4, 2.3.5, and 2.3.6.)

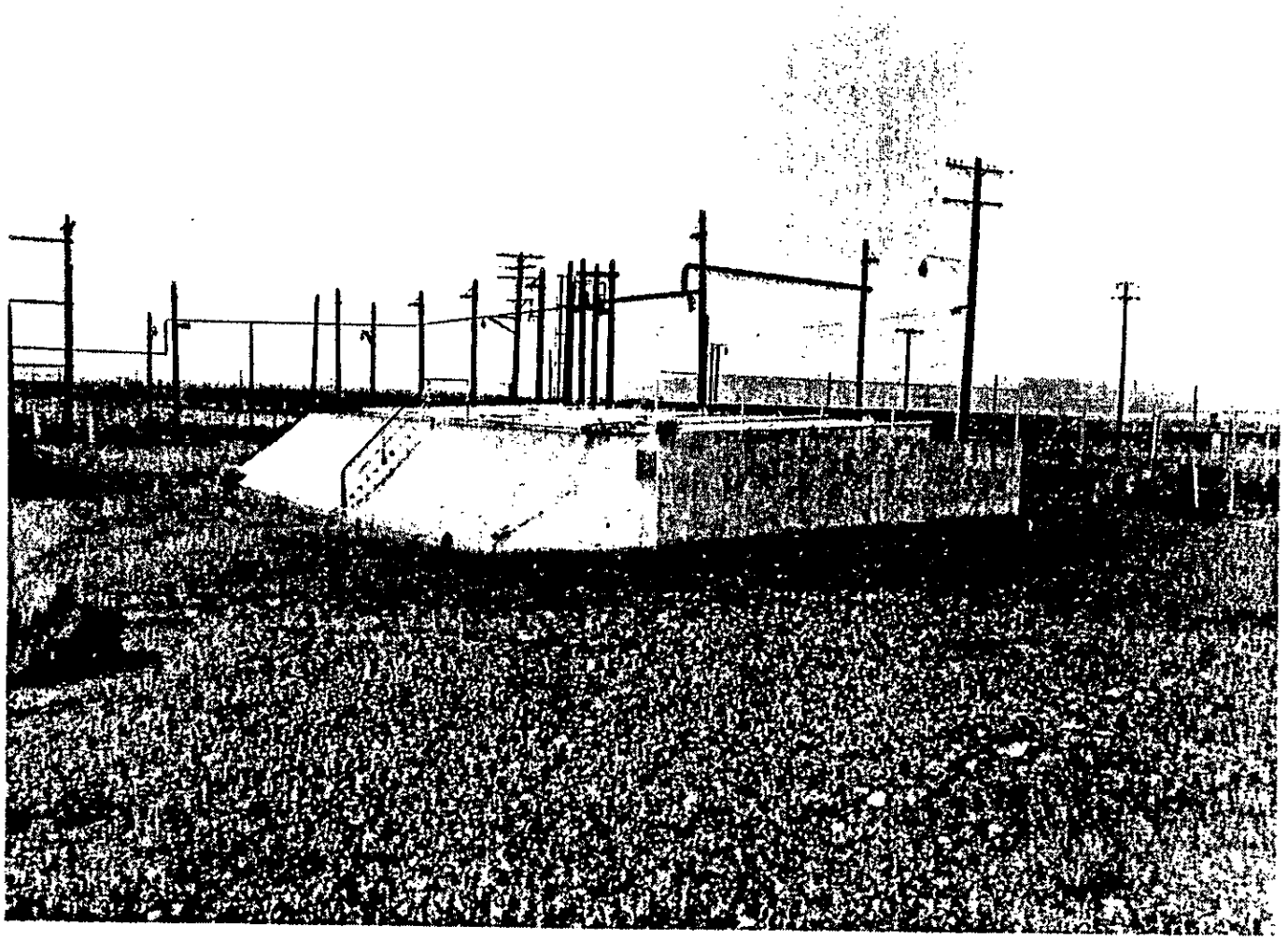


FIGURE 2.3.1

117-F FILTER BUILDING PRIOR TO APRIL 1983

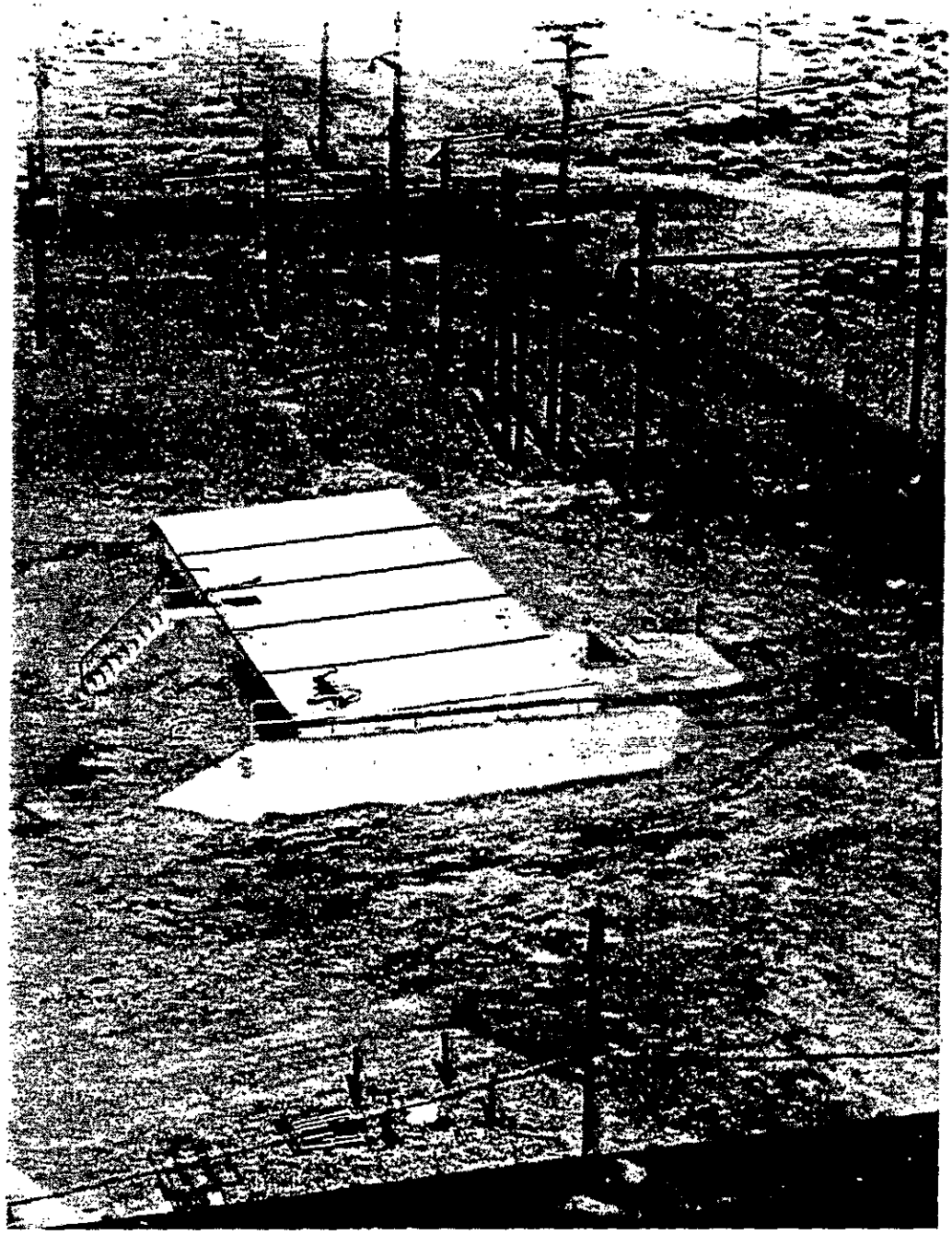
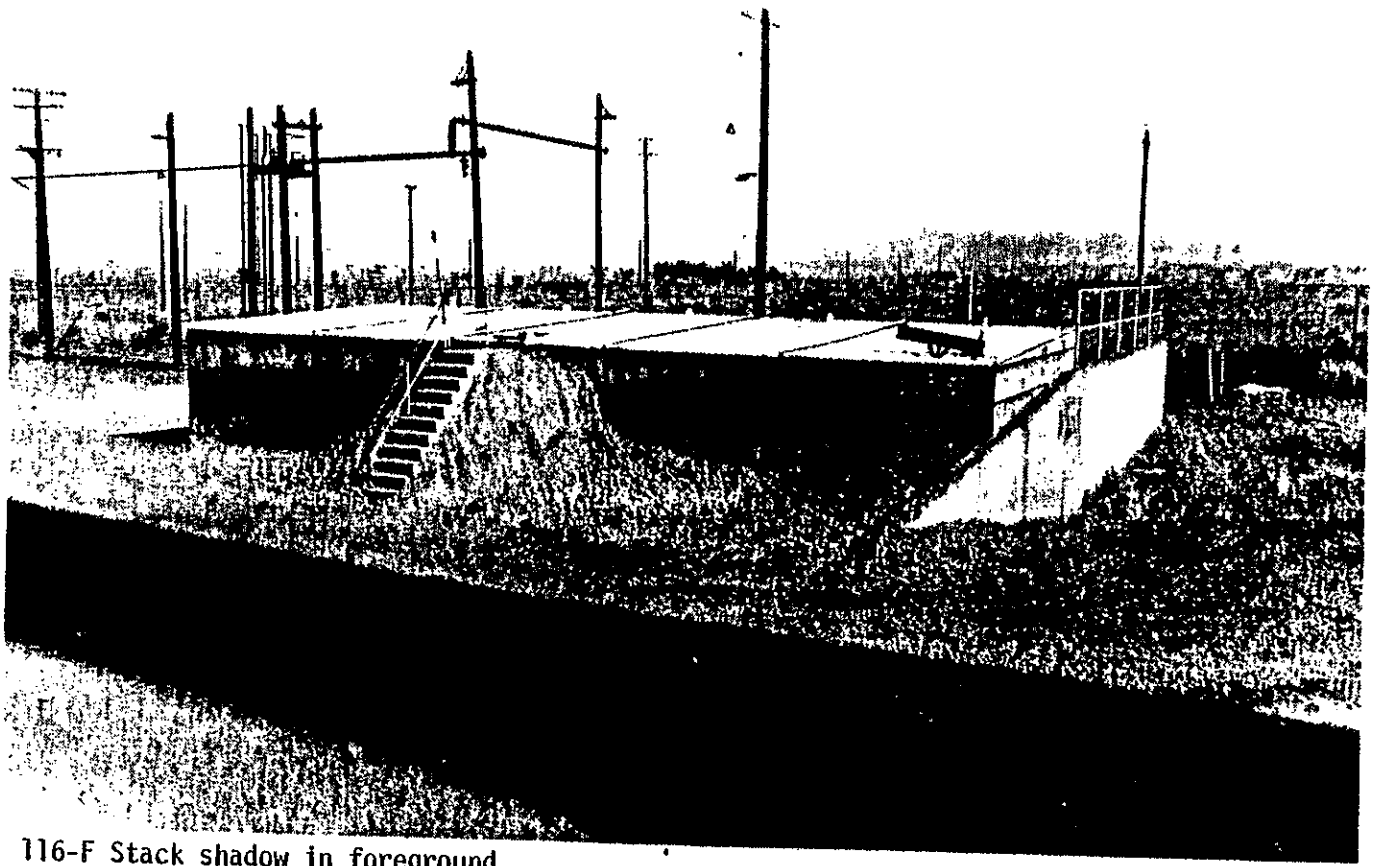


FIGURE 2.3.2
PRELIMINARY EXCAVATION 117-F FILTER BUILDING
AERIAL VIEW



116-F Stack shadow in foreground.

FIGURE 2.3.3
PRELIMINARY EXCAVATION 117-F FILTER BUILDING
GROUND VIEW

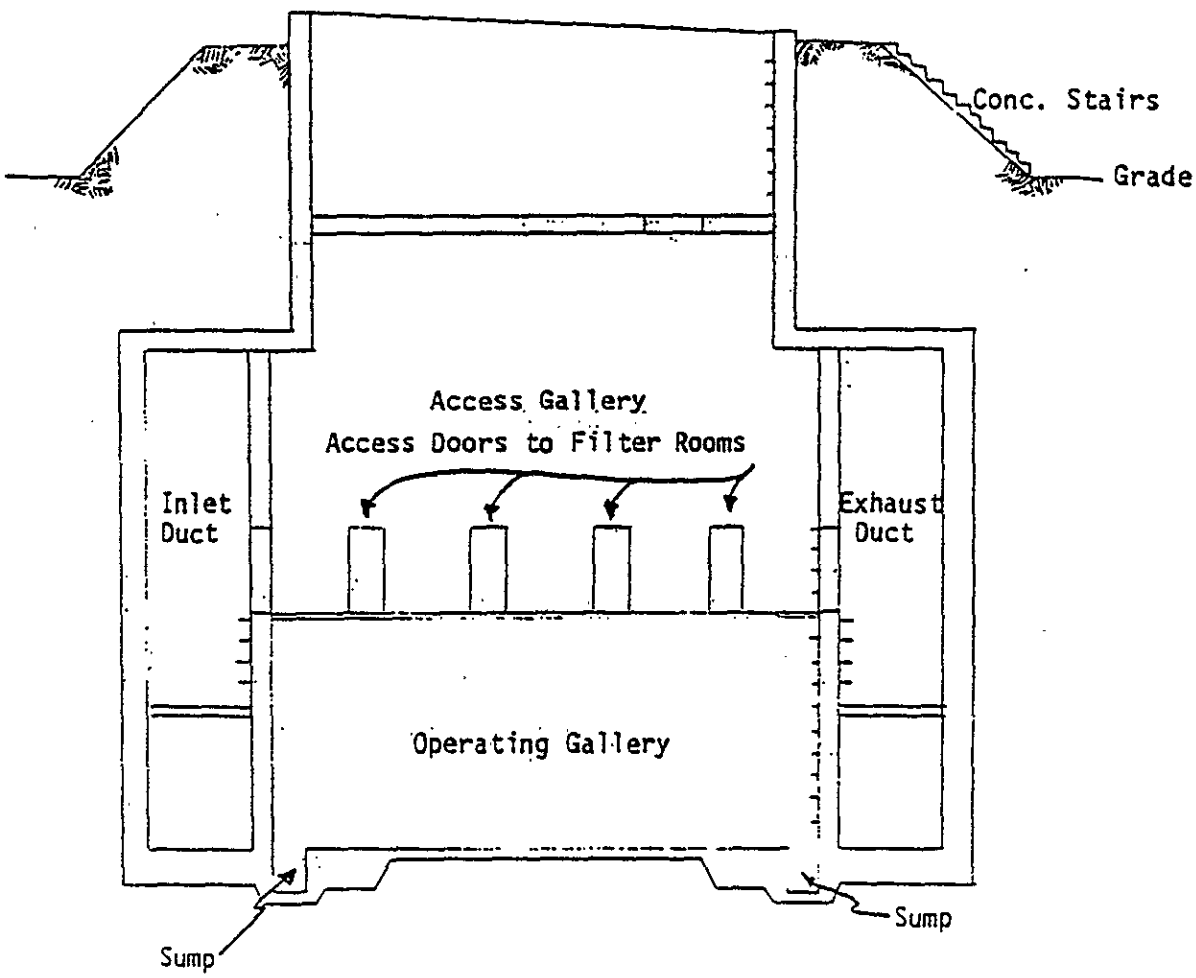


FIGURE 2.3.4
117-F FILTER BUILDING SHOWING GALLERIES

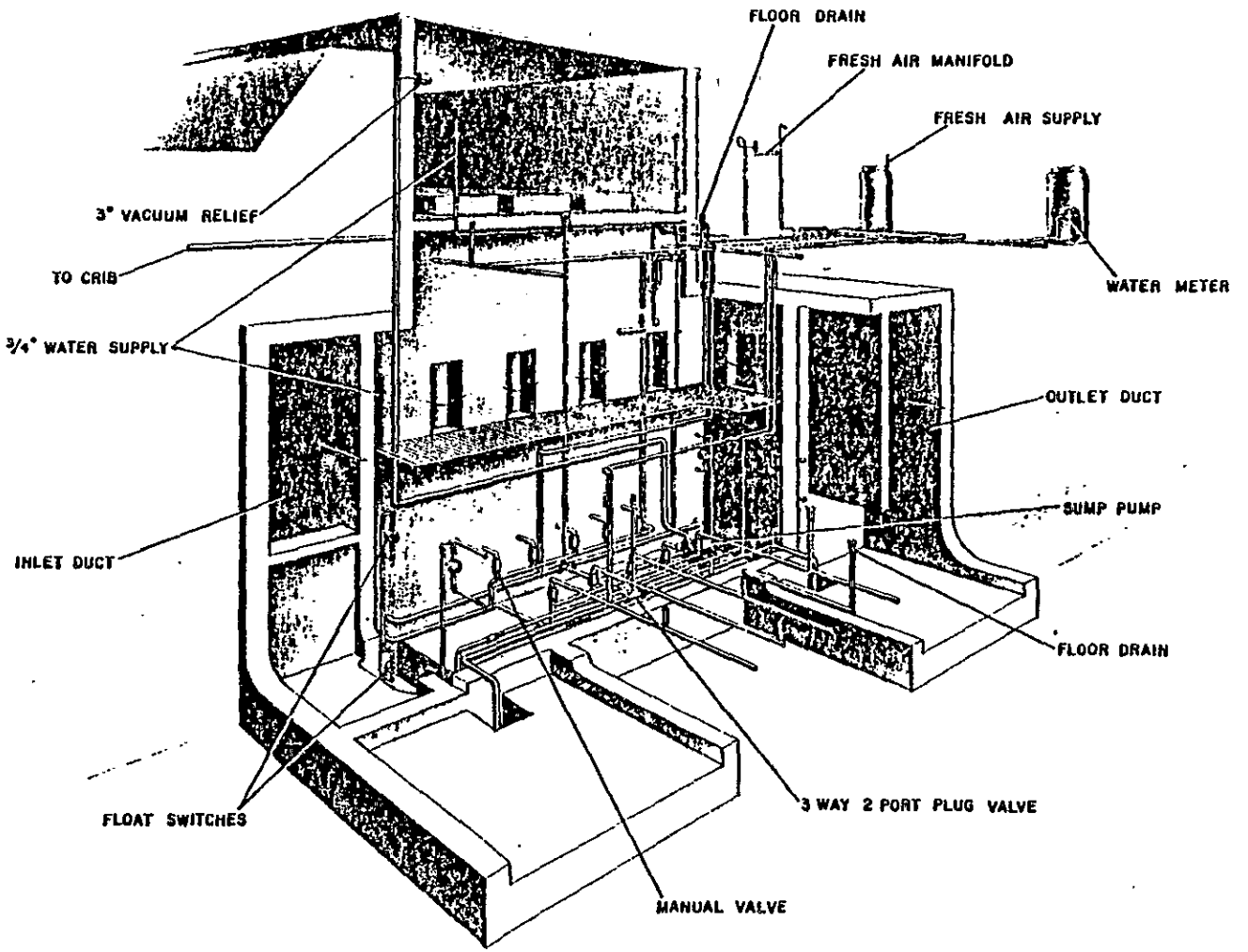


FIGURE 2.3.5

117-F FILTER BUILDING CUT-AWAY VIEW

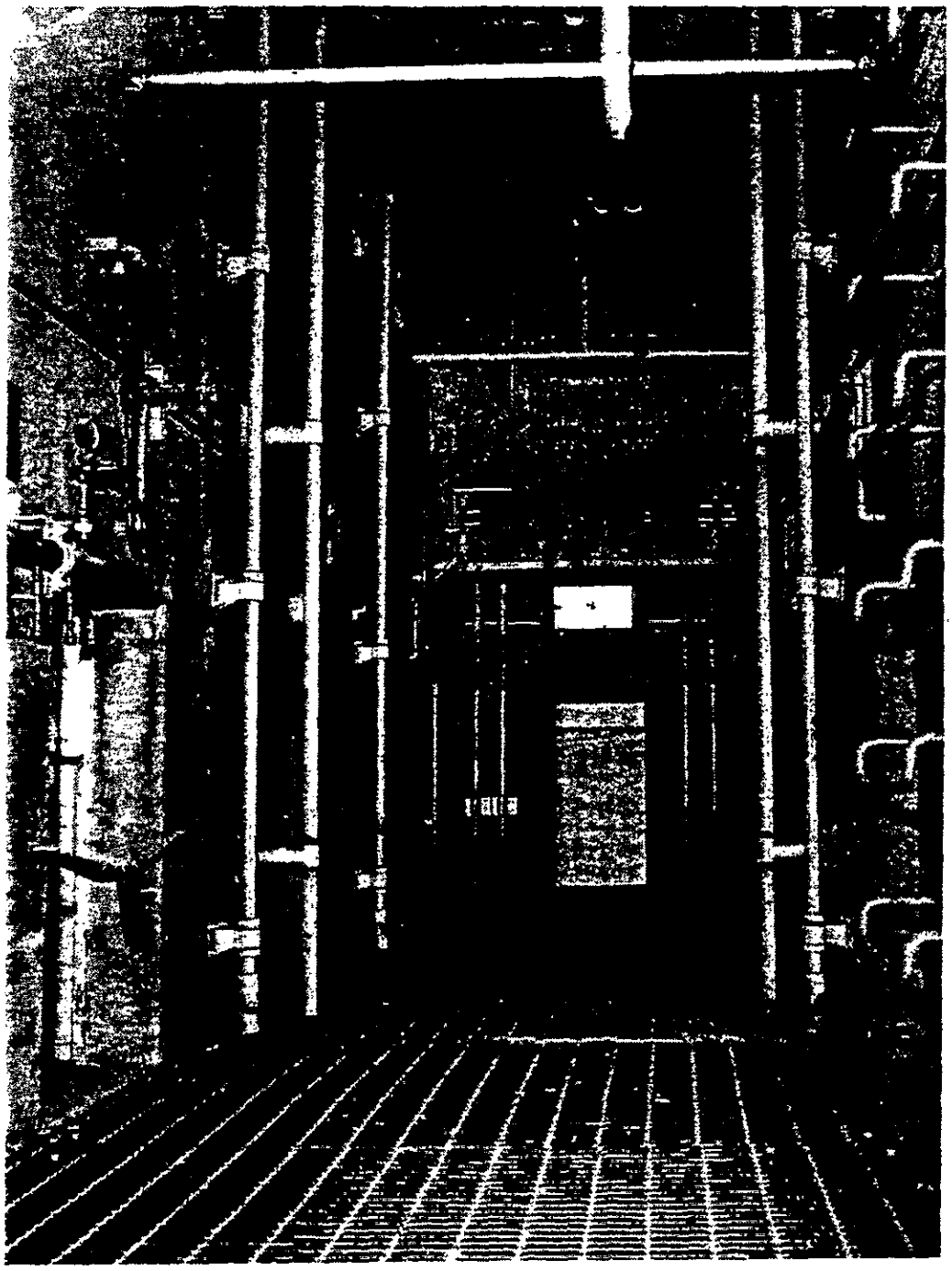


FIGURE 2.3.6
ACCESS GALLERY 117-F FILTER BUILDING

The lower-story Operating Gallery contained the majority of the piping and valving, including water lines, drain lines, air lines, and the exhaust fan system lines. One 200-gpm sump pump was located at the lowest elevation to prevent possible flooding. (See Figures 2.3.7 and 2.3.8.)

Each cell was designed with six berths, arranged in three banks with two berths per bank. Each filter berth contained one aluminum filter frame that held 24 absolute or halogen filters, each of which was 24 x 24 x 12 inches in size. (See Figures 2.3.9, 2.3.10, 2.3.11, and 2.3.12.)

An electric-driven turbine exhauster fan was located in the fan pit to circulate the air and maintain a negative pressure during filter removal or maintenance. Since the filter change operation was never implemented during the 5-year period that 117-F operated, the exhauster fan was never put into operation for its designed function. Removable roof panels functioned as upper weather seals, and rectangular concrete covers functioned as upper radiation shields for the filter banks. (See Figures 2.3.9, 2.3.13, 2.3.14, and 2.3.15.)

2.4 Pre-Decommissioning Status

2.4.1 Facility Condition

Although the 117-F Filter Building had not been in operation for 18 years, the condition of the building was good. No corrosion was visible and only dust and small amounts of dirt had settled into the building.

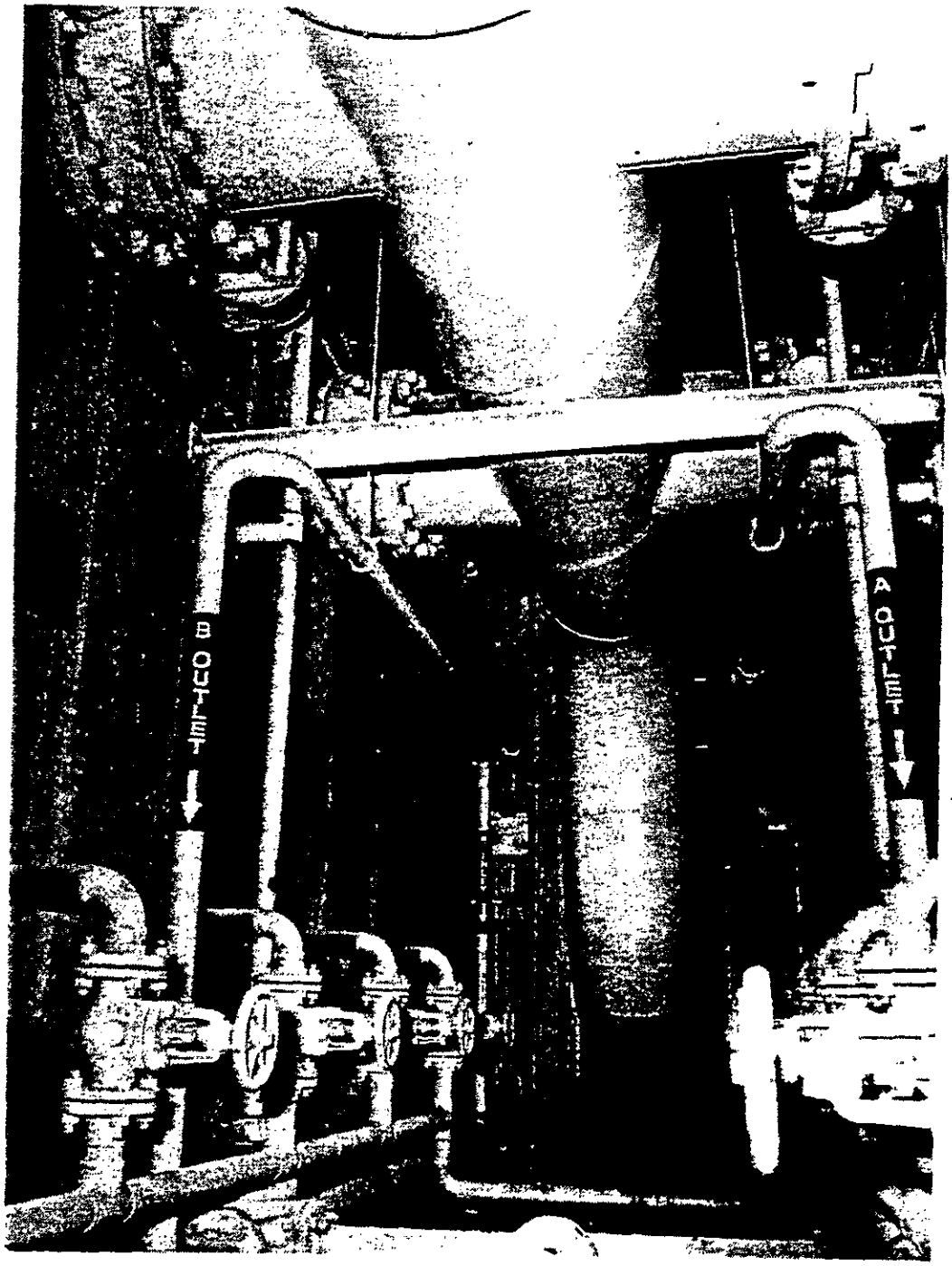


FIGURE 2.3.7
OPERATING GALLERY 117-F FILTER BUILDING

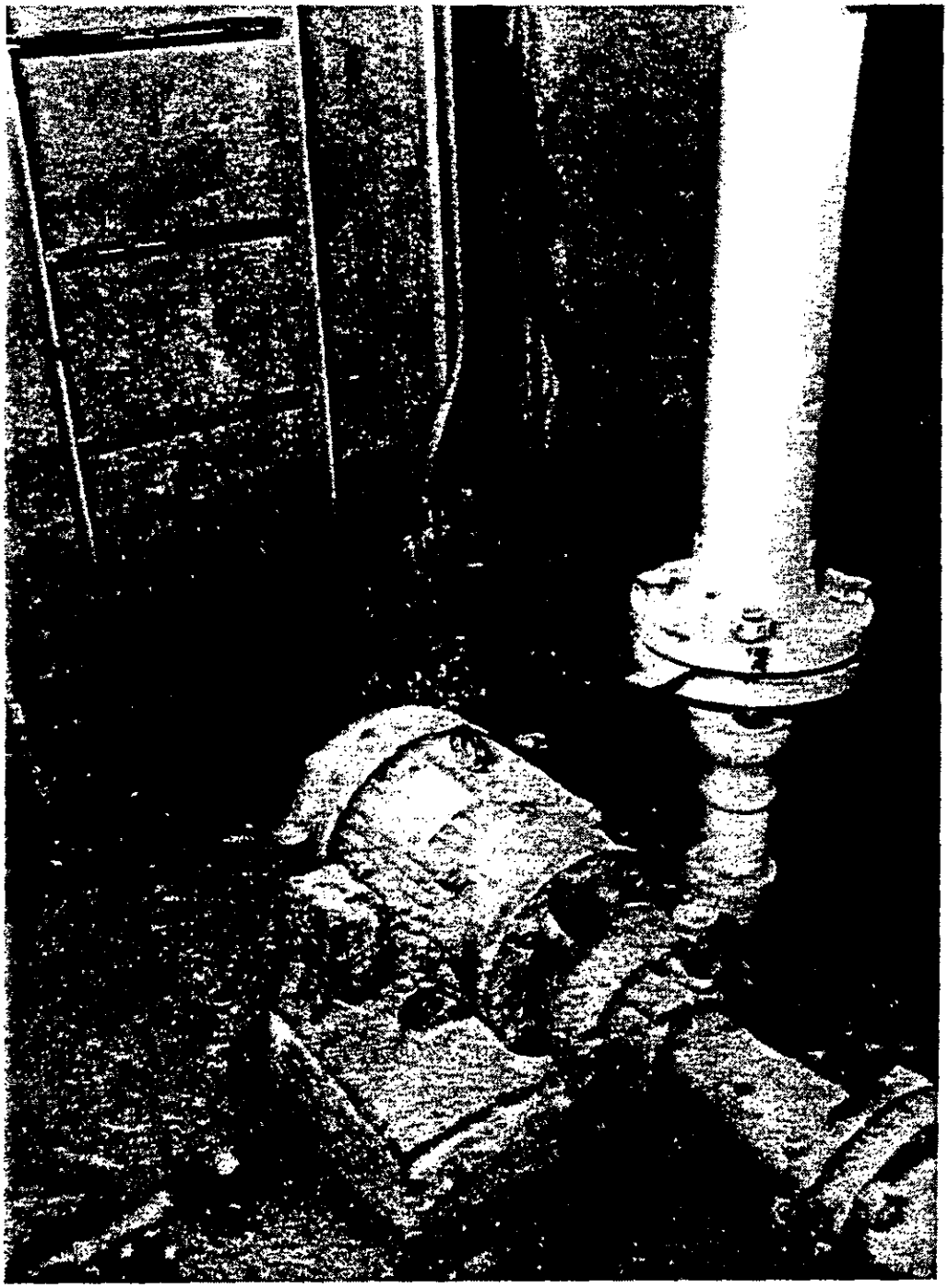


FIGURE 2.3.8
SUMP PUMP OPERATING GALLERY 117-F FILTER BUILDING

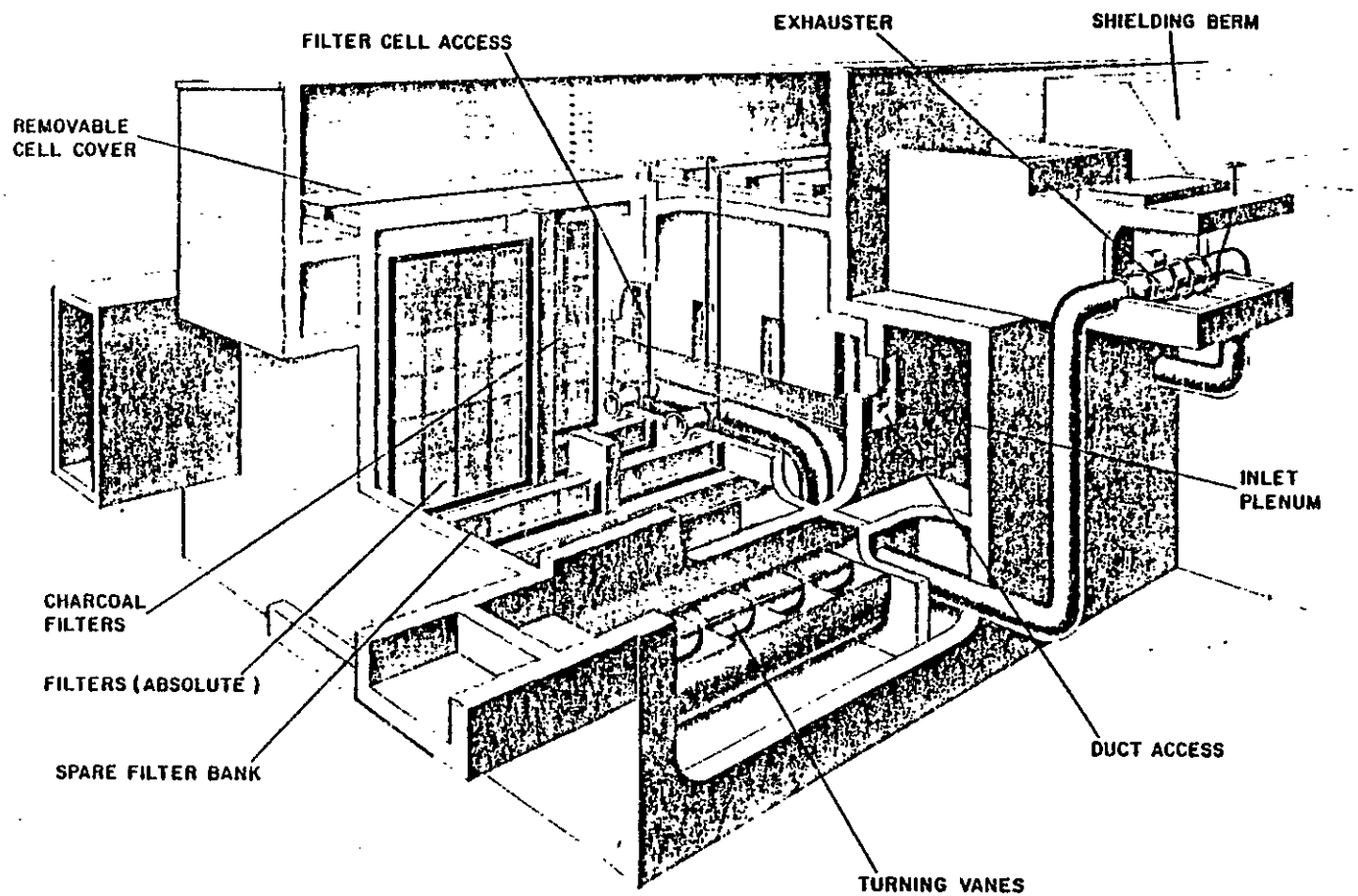


FIGURE 2.3.9
117-F FILTER BUILDING

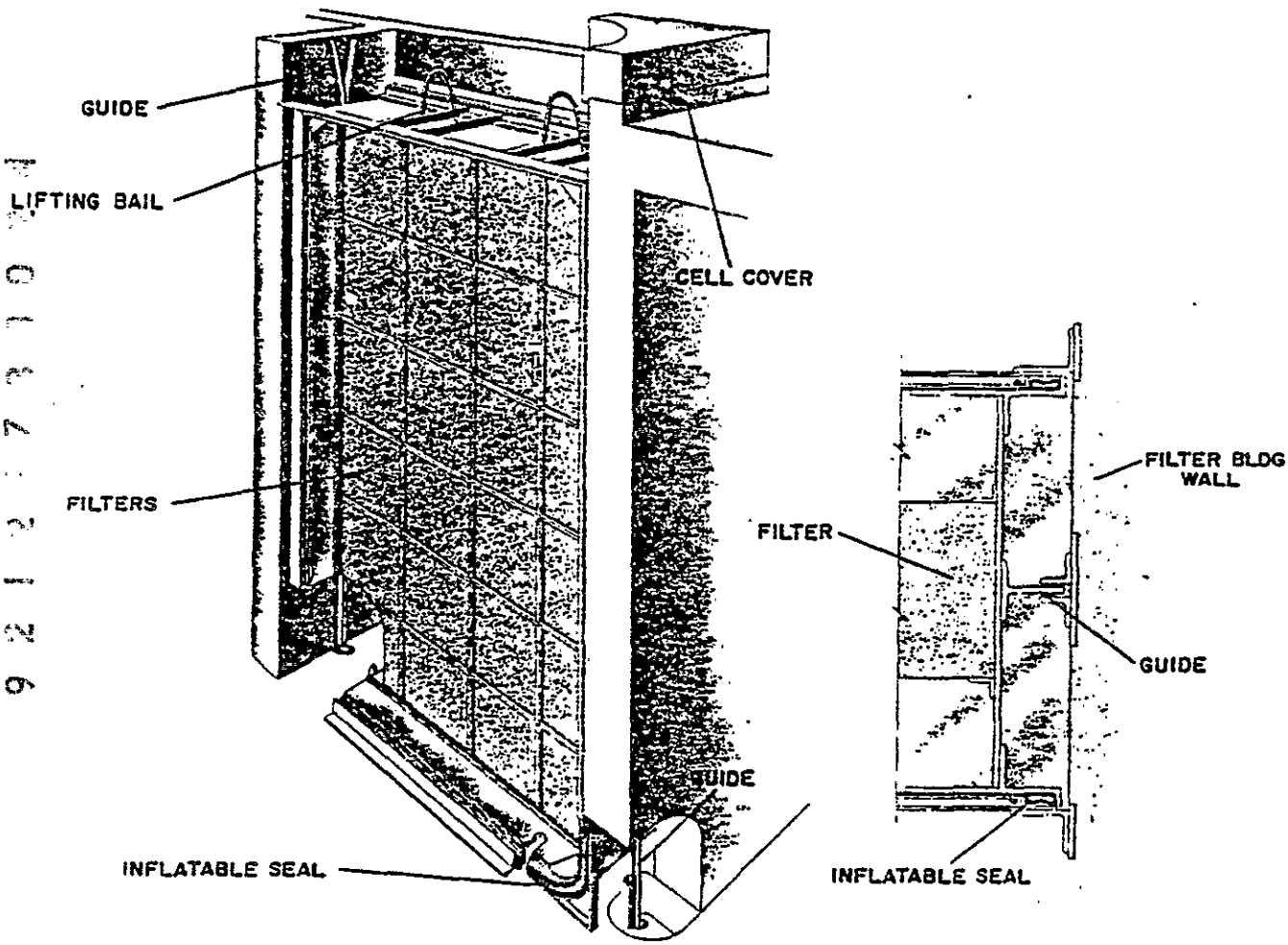


FIGURE 2.3.10

117-F FILTER BUILDING -- TYPICAL FILTER BANK ARRANGEMENT

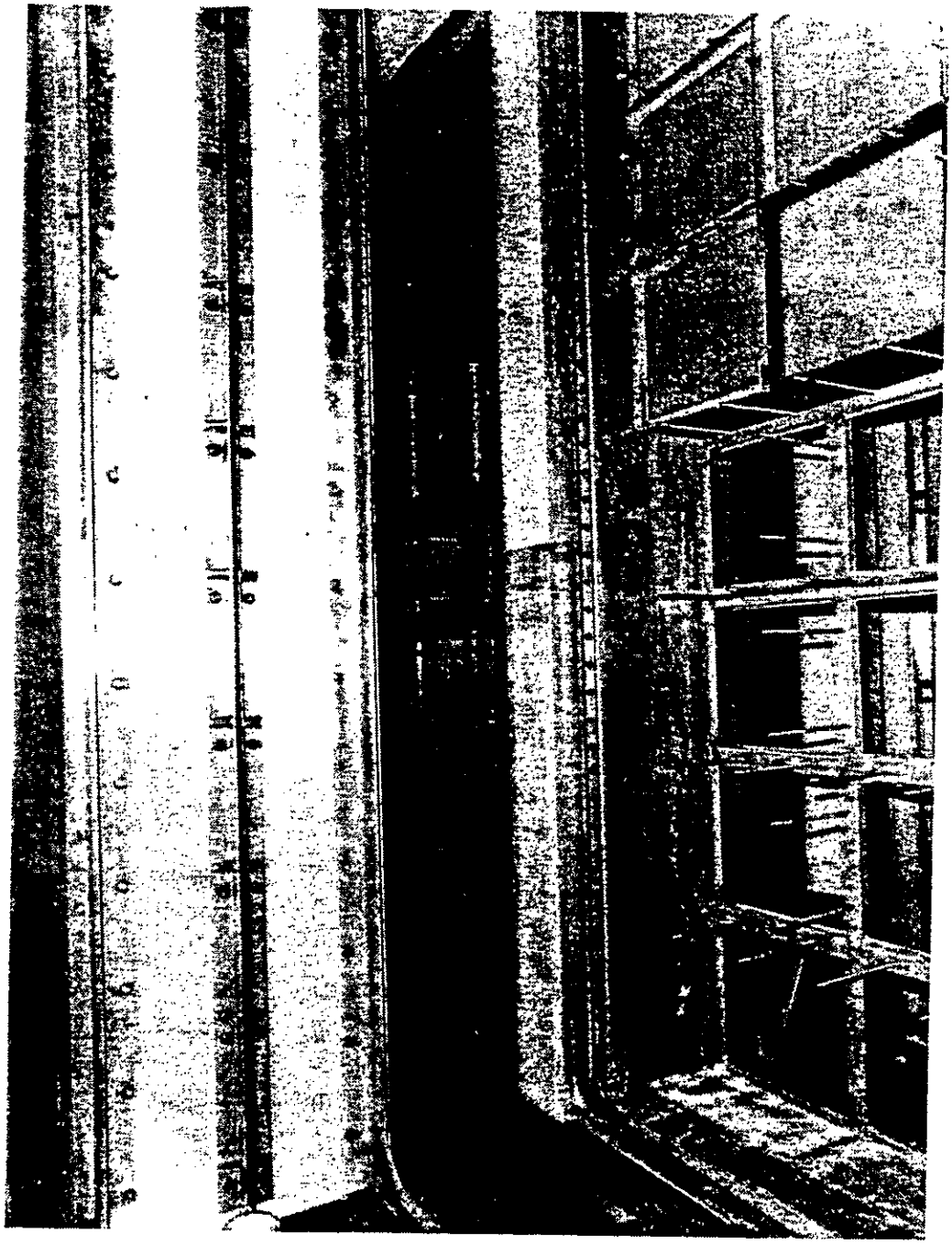


FIGURE 2.3.11
FILTER BERTHS

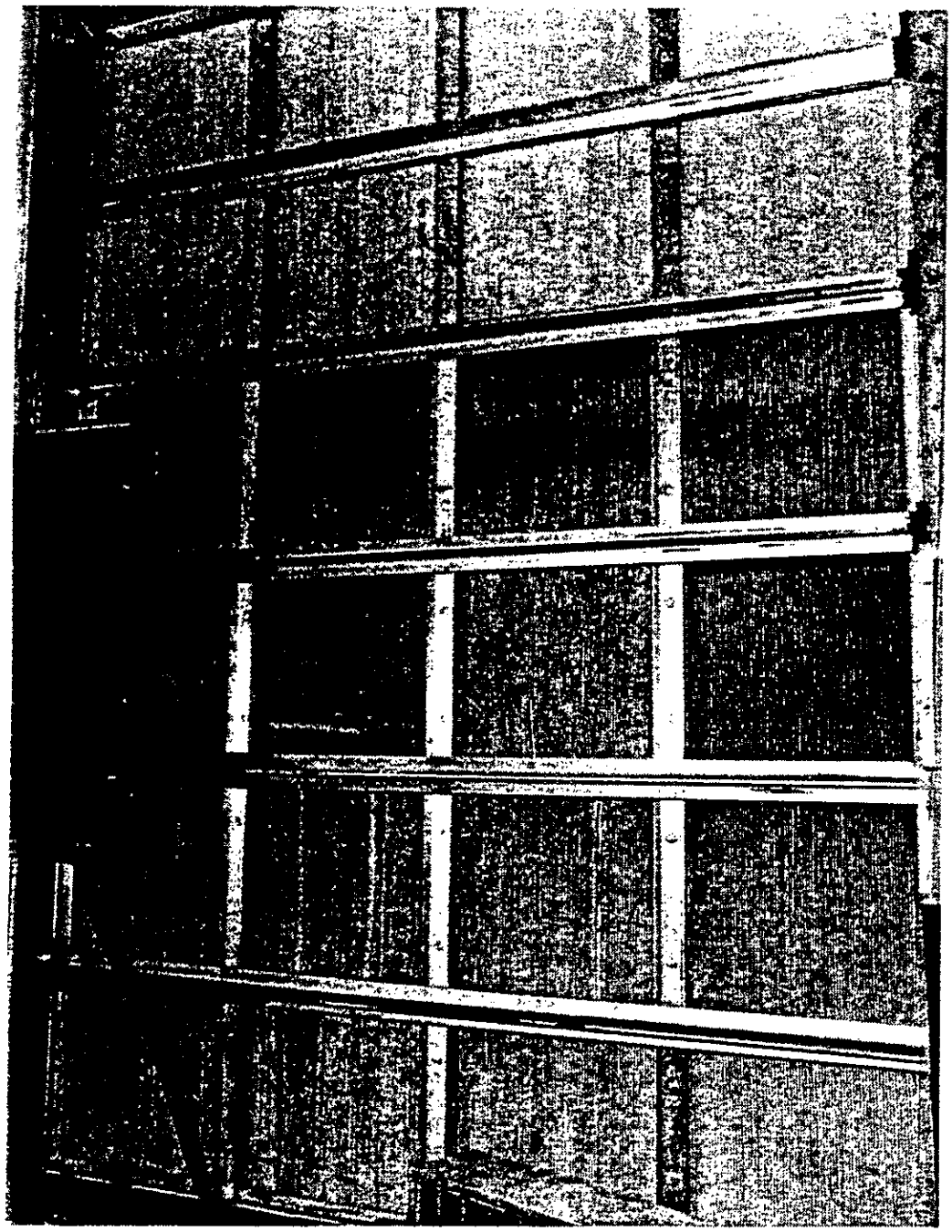


FIGURE 2.3.12
FILTER BANKS

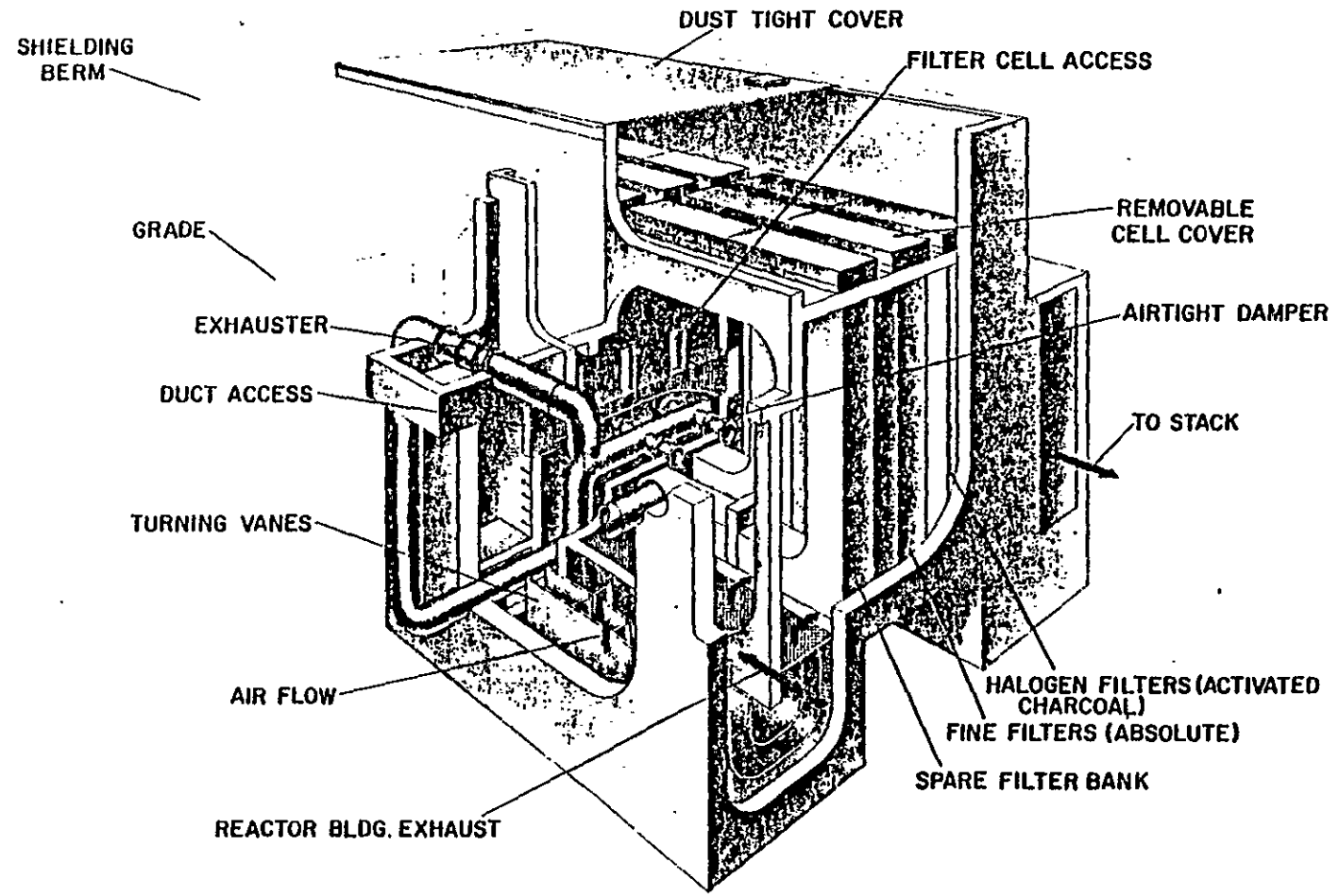


FIGURE 2.3.13
117-F FILTER BUILDING

FIGURE 2.3.14
TURN VANE SEAL PIT

FIGURE 2.3.15
RECTANGULAR CONCRETE COVERS AND REMOVEABLE ROOF PANELS

2.4.2 Radiological Contamination

Those portions of the 117-F Building which had been in contact with the reactor confinement zone exhaust air contained varying amounts of low-level surface contamination. Background radiation levels in the building were generally less than 1 mR/hr, with a maximum reading of 2 mR/hr. Readings through piping and other equipment ranged up to 25,000 c/m on a GM probe. Contamination levels recorded in an August 1976 survey (see UNI-946, Reference 11) are shown in Table 2-1.

At the time the decommissioning operations started, the radiation and contamination levels within the 117-F building and the inlet and exhaust ducts were low enough so that no significant exposure problems were presented to personnel working in the facility. The direct surface reading within the inlet duct to the 117-F Building was on the order of 4,000 to 5,000 c/m, with dose rates to personnel working within the duct less than 1 mR/hr. A minimal amount of smearable contamination was present.

The direct surface reading within the 117-F exhaust duct was on the order of 1,000 to 2,000 c/m, with dose rates less than background and smearable contamination less than background.

See UNI-2674 (Reference 2) for the final radiation release report.

TABLE 2.1

117-F Building Contamination Survey Results

LOCATION	DISTANCE	RADIATION LEVEL (c/m or d/m)
A-2 Filters	1 in.	2,000 c/m max.
Floor Drains	1 in.	2,000 c/m max.
A-1 & A-2 Cells	Field	*300 c/m
Filters (Smears)	Surface	1,000 c/m
Floors & Walls, A-1 & A-2 Cells	Surface	1,000 c/m
Alpha Smears A-1 & A-2 Cells	Surface	200 d/m
Inlet Duct	Field	*300 c/m
Inlet Duct - Scan of Floor	1 in.	600 c/m
Inlet Duct - Scan of Turning Vanes	1 in.	600 c/m
Inlet Duct - Smears Floor & Walls	Surface	1,500 c/m
Inlet Duct - Smears Turning Vanes	Surface	1,000 c/m
Inlet Duct - Alpha Sources	Surface	200 d/m
Exhaust Duct	Field	200 c/m - Gen
Exhaust Duct - Scan of Floor & Walls	1 in.	200 c/m
Exhaust Duct - Smears Floor & Walls	Surface	600 c/m
Exhaust Duct - Smears Turning Vanes	Surface	600 c/m
Exhaust Duct - Alpha Smears	Surface	200 d/m

*General Background

3.0 DECOMMISSIONING OBJECTIVE AND WORK SCOPE

3.1 Project Objective

The objective of this decommissioning project was to decontaminate the 117-F Building to unrestricted release levels in accordance with the Radiation Control Manual (Reference 1), demolish the building by conventional means, and grade the site to blend with the surrounding terrain.

3.2 Project Scope

The scope of the 117-F Building decommissioning work included:

- Engineering and planning
- Procurement of waste containers
- Radiation surveys and sampling
- Development of methods and procedures for removal of equipment and decontamination of structure
- Final site survey and sampling
- Preparation for final project closeout report

3.3 Project Planning Review

Independent reviews of UNC's readiness to safely begin the planned decommissioning work were conducted by a Battelle Pacific Northwest Laboratory consultant and by UNC's internal Company Nuclear Review Board (CNRB).

Both review agencies independently concurred that the systems developed by UNC's Decommissioning Operations were adequate to assure safe conduct of the planned work. Approval was given by the CNRB to begin the work when all procedures and documents were issued and training was completed.

3.3.1 Project Training Program

Training was conducted for all project personnel in formal approved Radiation Work Procedures (RWPs), specific tasks outlined in Detail Work Procedure DWP-117-1, and industrial safety practices. This training program was reviewed and approved by UNC's CNRB for this project work.

3.3.2 Project Documentation

The documents listed in paragraph 1.2 (References 1 through 10) were used as the principal procedures and criteria for the safe and effective conduct of the work. These documents were approved for this purpose by UNC's CNRB.

In addition, the following engineering drawings depict the structural and architectural aspects plus the installed service and equipment facilities with the 117-F Building and inlet and exhaust ducts:

H-1-19803 - Plot Plan - 117-F Bldg.
H-1-19818 - Air Intake and Exhaust Duct Profiles
H-1-19838 - Structural Concrete - Sections and Details
H-1-19839 - Structural Concrete - Sections and Details
H-1-19840 - Structural Concrete - Sections and Details
H-1-19874 - Piping - Filter Bldg. - Arrangement and Sections
H-1-19875 - Piping - Filter Bldg. - Sections and Details
H-1-19876 - Piping - Filter Bldg. - Details
H-1-19888 - Duct Turning Vanes

3.4 Decommissioning Project Work Steps

3.4.1 Site Preparation

The following work elements were accomplished in preparing the site for the decommissioning work.

1. Radiation control measures were defined in accordance with approved Radiation Work Procedures (RWPs). The following site preparation steps were conducted in accordance with approved RWPs.

2. Radiation work zones were established, step-off pads were placed, and air monitoring equipment was installed in strategic locations.

3. Temporary electrical power was provided. The existing wiring in the 117-F Building was reactivated to provide power for lighting and electrical power tools, grinders, saws, vacuum cleaners and air monitoring equipment.

4. The inlet and exhaust ducts were blocked off with plywood partitions at the head of the inlet duct and at the mouth of the exhaust duct for the purpose of isolating the 117-F Filter Building from the 105-F Building and the 116-F Stack.

5. Preliminary radiation survey was completed, and the decommissioning work began April 1983.

3.4.2 117-F Building Work

The following steps were the major work elements in decommissioning the 117-F Building structure and equipment. (The work sequence for the inlet and outlet ducts is described in paragraph 3.4.3.)

1. Dust was vacuum cleaned from the floors and walls to prevent any loose contamination from spreading to noncontaminated areas.

2. All remaining filters in both the particulate and charcoal filter banks were unbolted and removed from their holding frames and placed in plastic bags, which were sealed with tape. (See Figures 3.1 and 3.2.)

3. The bagged filters were then placed in containers meeting DOT-7A radioactive waste material criteria plus Rockwell Hanford Operations (RHO) waste disposal requirements. (See Figure 3.3.)

4. The aluminum filter frames were decontaminated by wiping the surface with Masslinn cloth. The frames that were successfully decontaminated were disposed of as clean waste. If decontamination was unsuccessful, the frames were cut into sections sized to fit into the shipping containers. Whenever cutting torches were used to cut up the frames, a HEPA filter exhaust ventilation system was used during the cutting to protect the worker from radioactive contamination and toxic fumes.

5. Complete decontamination of the filter cells was accomplished with the use of Masslinn wipes, wire

FIGURE 3.1
REMOVING HEPA FILTER
117-F FILTER BUILDING

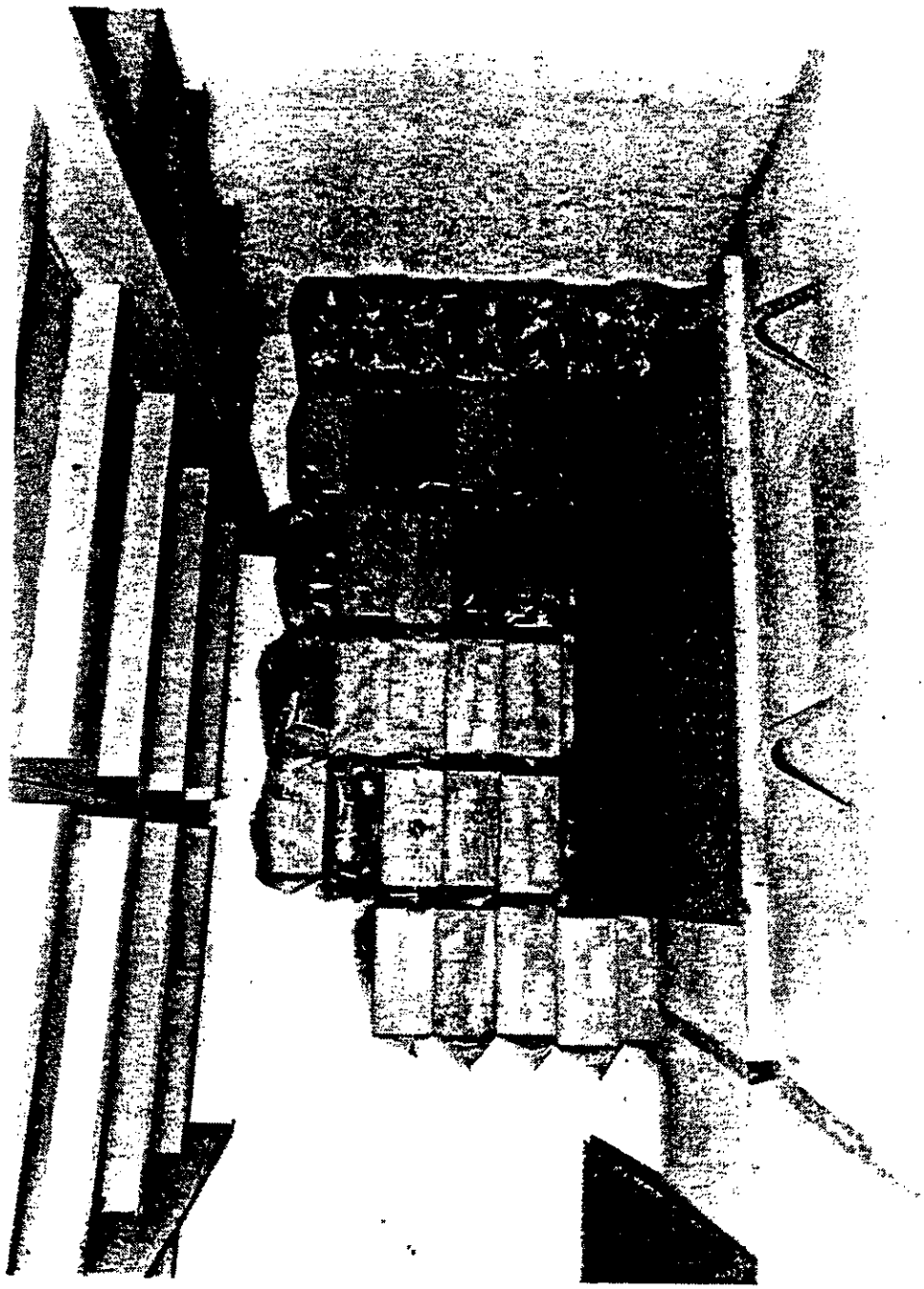


FIGURE 3.2
HEPA FILTERS BEFORE CONTAINER PACKAGING

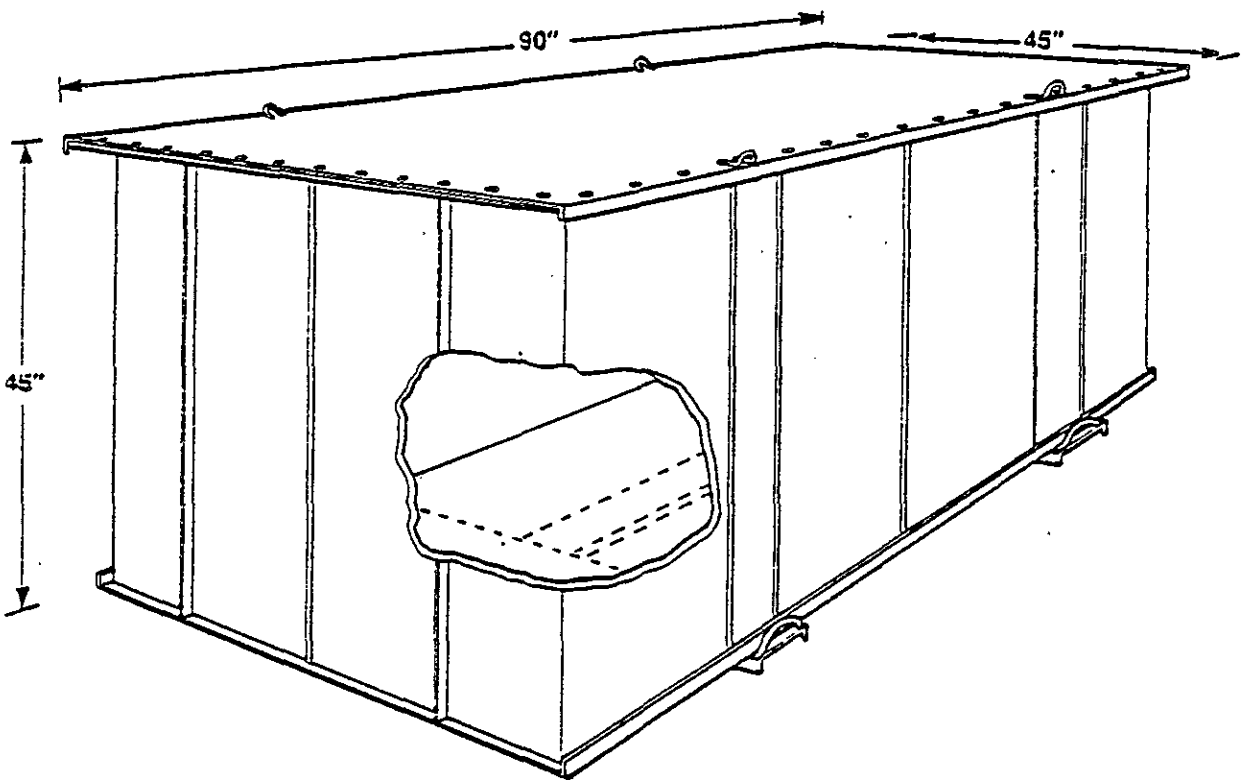


FIGURE 3.3
LSA WASTE CONTAINER

brushing and other techniques. The drains were verified to be uncontaminated. All deck gratings (Figure 3.4) were left in place after decontamination, as an industrial safety precaution.

6. All noncontaminated and decontaminated piping, electrical gear, filter frames, grating, turning vanes, and other equipment were buried in place at the 117-F Building site.

7. All radioactive waste generated from the 117-F decommissioning project (Table 3.1) was packaged for transport in accordance with Reference 10.

8. Loaded shipping containers were surveyed and trucked approximately 16 miles to the 200 West Area burial grounds. All radioactive waste was buried in accordance with RHO disposal criteria.

TABLE 3.1
Contaminated Waste Generated in Decommissioning Building 117-F

WASTE ITEMS	VOLUME (ft^3)	VOLUME (m^3)	WEIGHT (lb)	WEIGHT (kg)
HEPA filters, steel, plastic, nuts, bolts	547	15.5	6760	3069

3.4.3 Inlet and Exhaust Duct Work

The following steps were the major work elements in decommissioning the 117-F Building air inlet and outlet ducts.

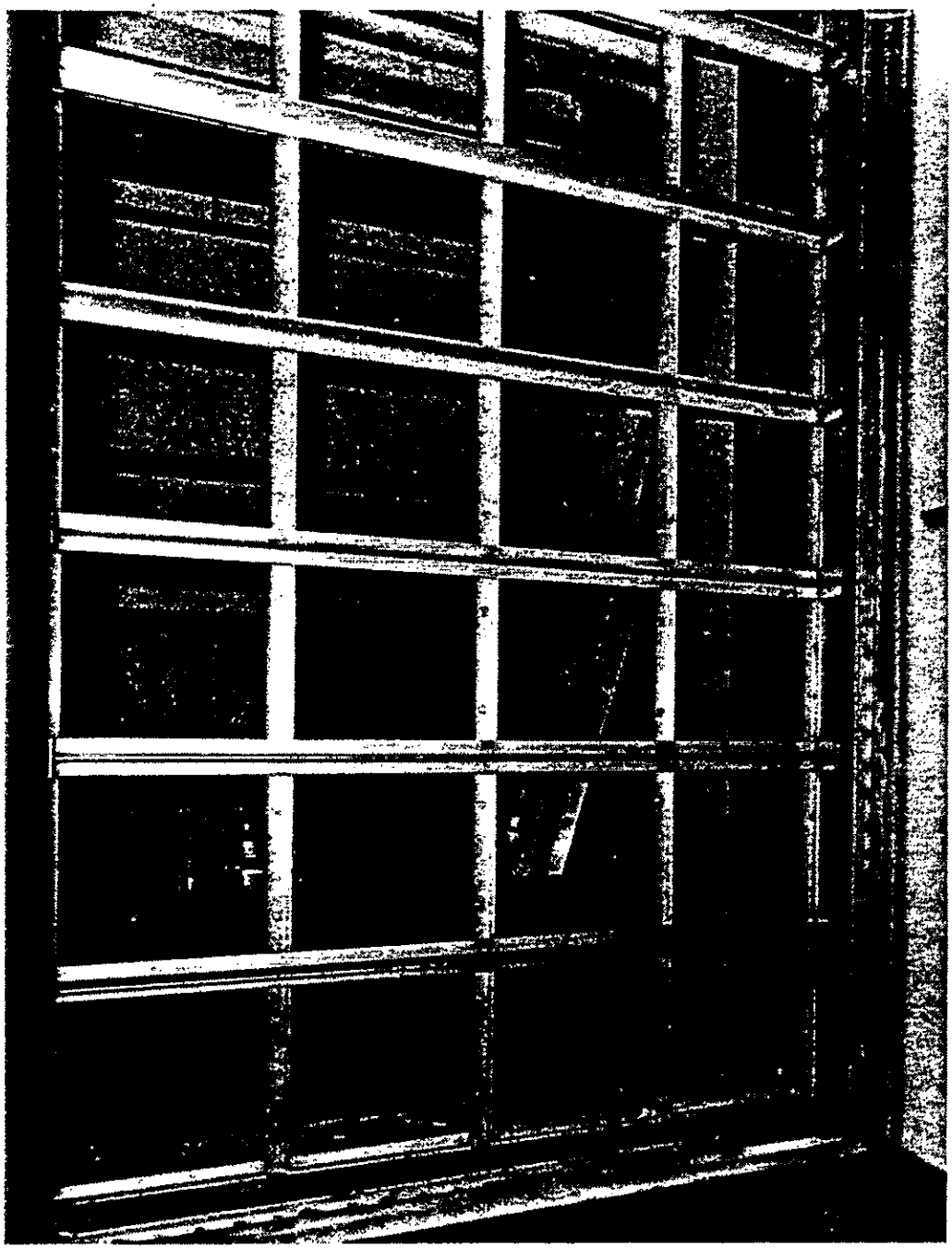


FIGURE 3.4
FILTER FRAMES AND DECK GRATING

1. Dust was vacuum cleaned from the internal duct surfaces to prevent any loose contamination from spreading to noncontaminated areas.

2. All internal equipment such as turning vanes and sampling and detection piping were removed. Noncontaminated equipment and successfully decontaminated equipment were buried on the building site as clean waste.

3. Contaminated equipment was wrapped, packaged, and shipped to the 200 West Area for burial in compliance with Reference 10.

4. All inside surfaces were wiped clean of any loose dust and marked off in 2m x 2m grids (Figures 3.5 and 3.6). Surface smears were taken in each grid and labeled. Paint samples were taken from each grid and labeled. Smears and paint samples were analyzed for radioactive contamination.

See Reference 2 for the Final Radiological Unconditional Release Report.

FIGURE 3.5
TAKING SMEAR SAMPLES

FIGURE 3.6
SAMPLING METHOD FOR PAINT

4.0 DEMOLITION METHODS

Demolition of the 117-F building and ducts was accomplished by conventional means, using a crane, demolition ball, and bulldozer. See Figures 4.1, 4.2, and 4.3. At completion of the demolition, the site (Figure 4.4) was backfilled with 615 yd^3 of clean soil and graded to blend with the natural terrain. Revegetation will be by natrual seeding of indigenous growth.

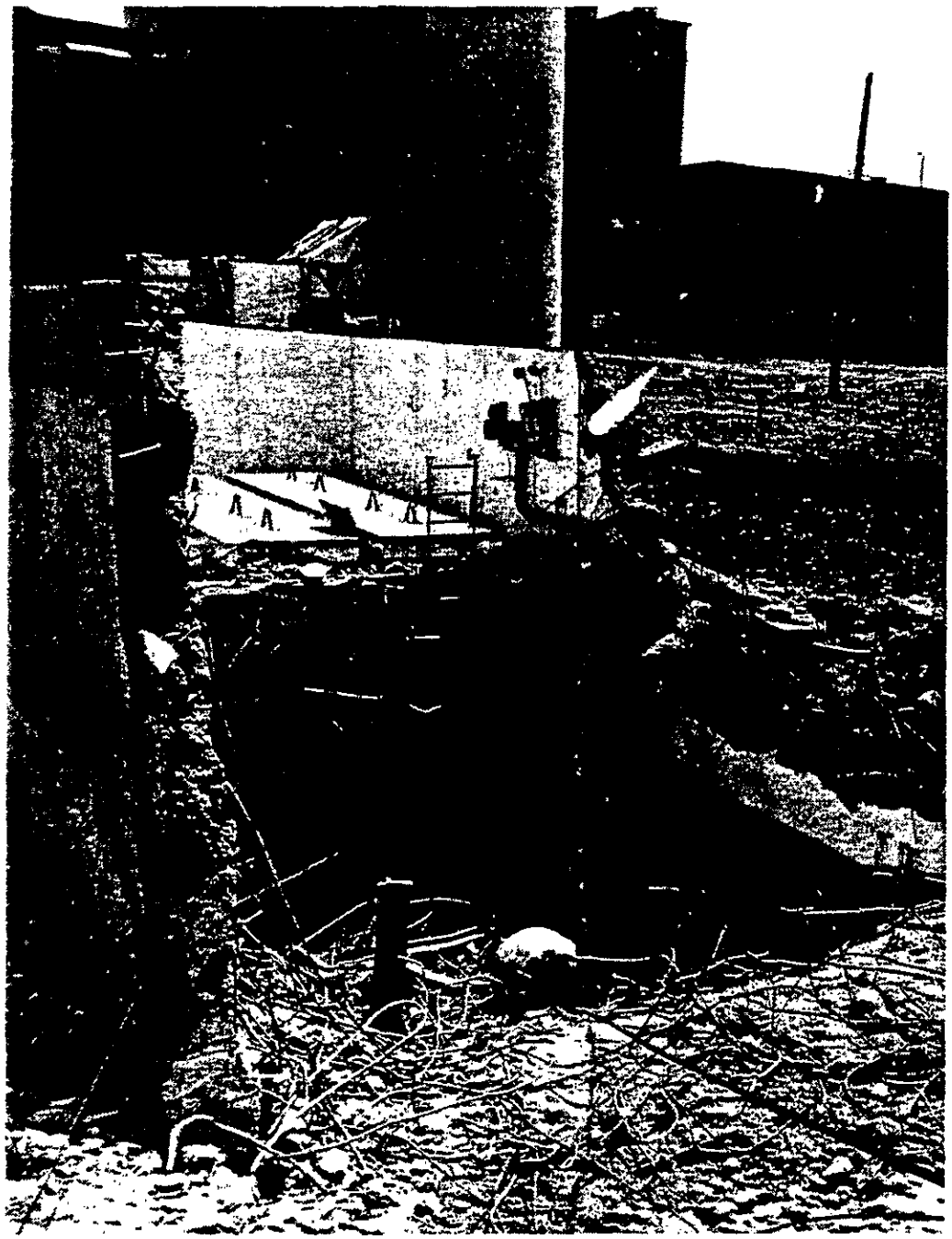


FIGURE 4.1
DEMOLITION OF 117-F WITH THE USE OF CRANE AND DEMOLITION BALL

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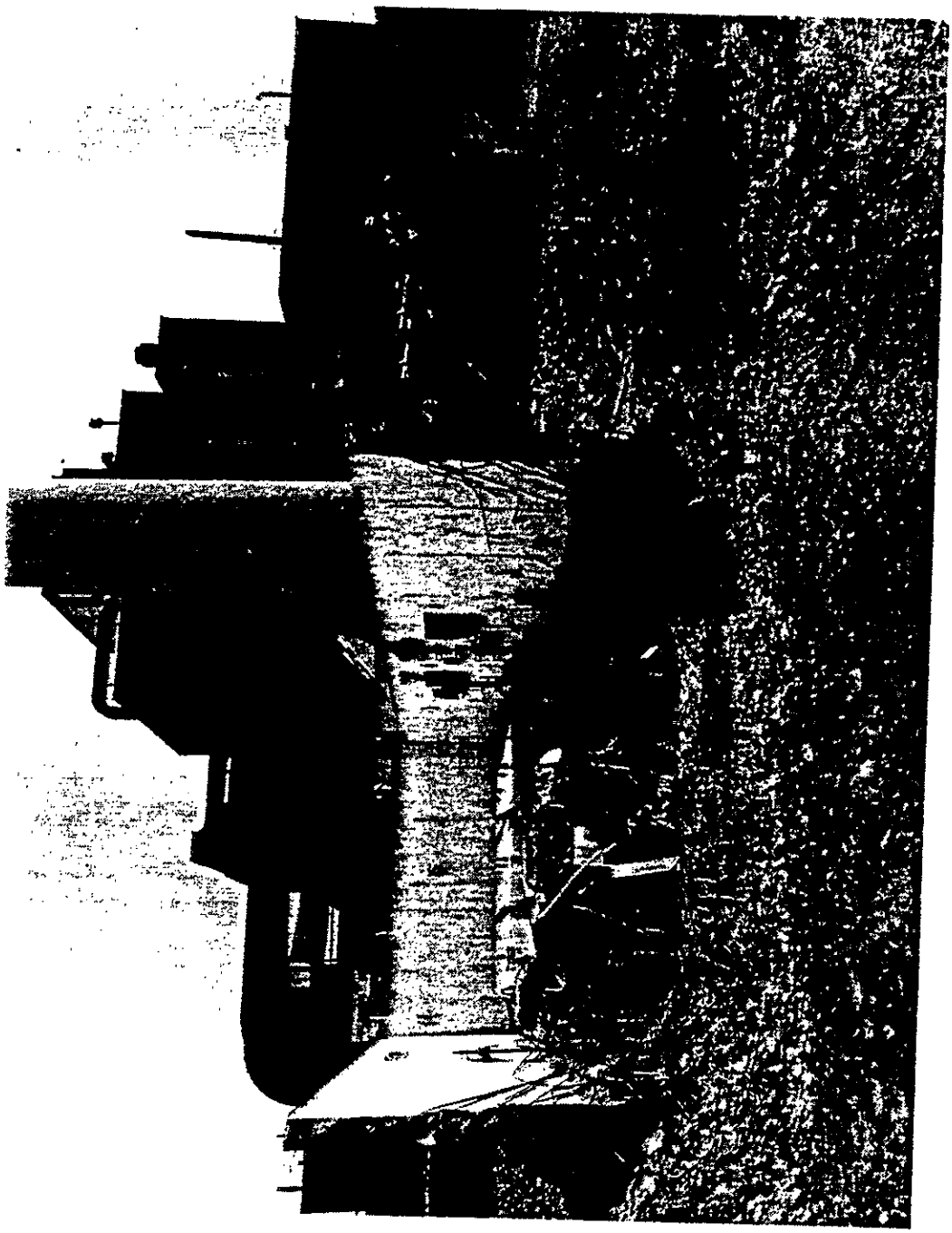

FIGURE 4.2
DEMOLITION OF 117-F WITH THE USE OF BULLDOZER

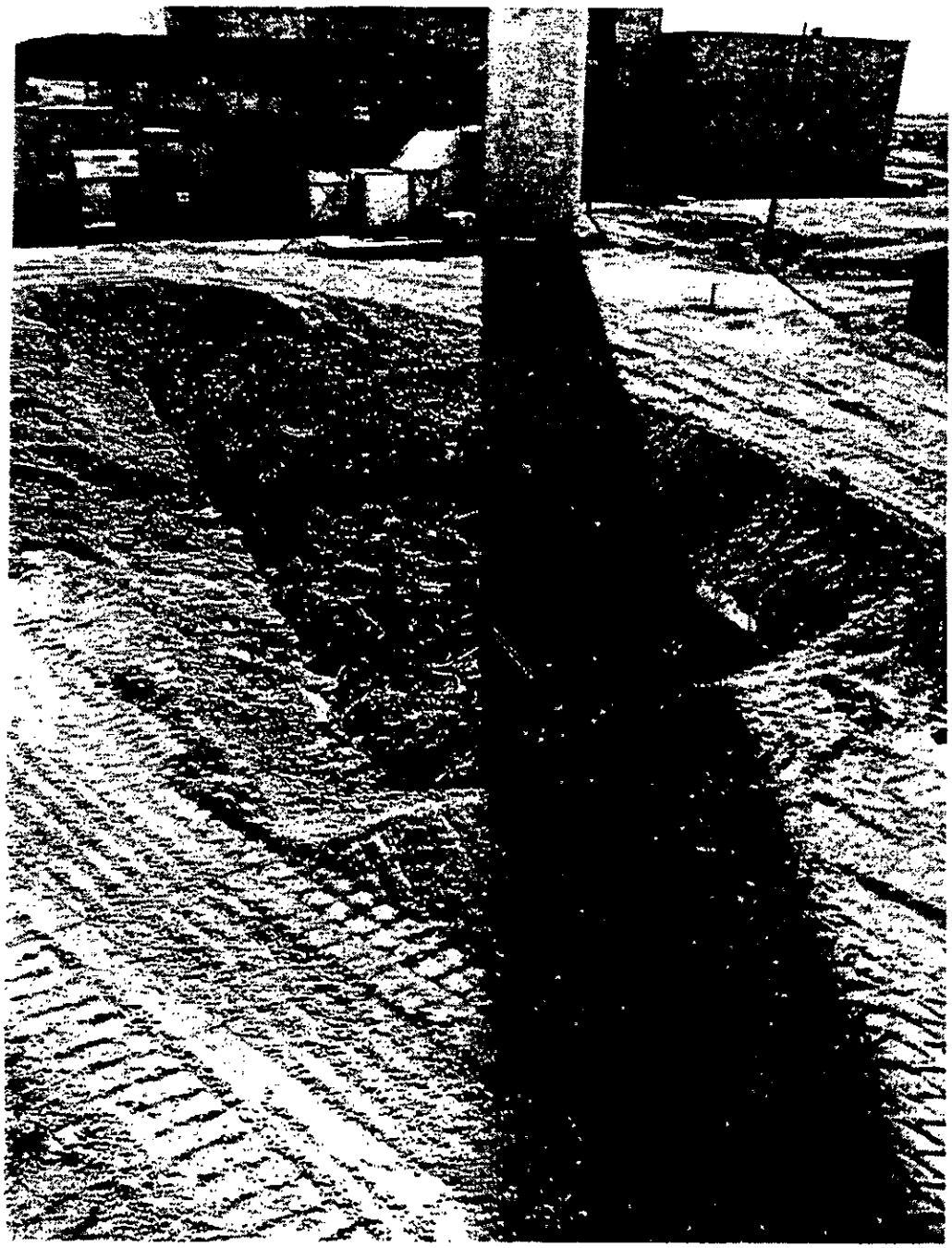

FIGURE 4.3
DEMOLITION COMPLETED

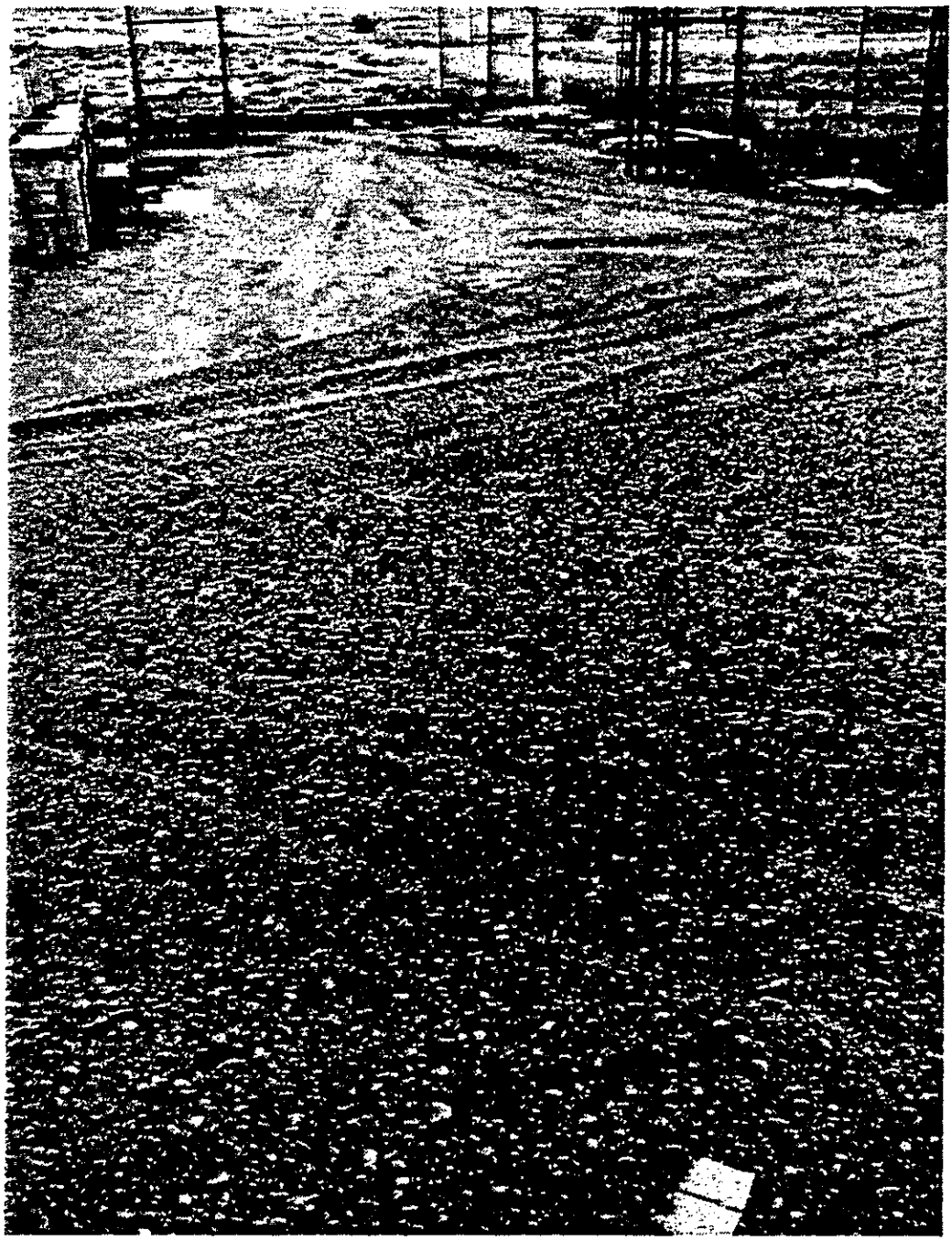

FIGURE 4.4
SITE BACKFILLED AND GRADED

5.0 117-F FACILITIES DECOMMISSIONING COSTS

The total costs for the 117-F decontamination and decommissioning are presented in Table 5.1. Project was completed within estimated cost. All work was completed during FY 1983. The project is closed out and no further work will be required.

TABLE 5.1
Cost Summary for Building 117-F
Decommissioning Project Through FY 1983

Activity	Cost ($1000)
Operation Management	6
Engineering	12
UNC Support Personnel	20
Radiological & Environmental Monitoring and Control	10
Waste Disposal	2
Decommissioning/Decontamination Workers (RHO)	20
Other Contractor Services	61
Material and Equipment Cost	33
Overhead Charges	31
Total D&D Costs	195